

Identified hadron production in Au+Au and Cu+Cu collisions at RHIC-PHENIX

M. Konno¹ for the PHENIX Collaboration

¹ Graduate School of Pure and Applied Sciences, University of Tsukuba

Contact e-mail: konno@rcf.rhic.bnl.gov

Studies of identified hadron production in heavy ion collisions at RHIC show particle type dependences on hadron yields and emission patterns at intermediate p_T (2-5 GeV/c). Especially, a difference between baryons and mesons is one of the findings. In central Au+Au collisions at $\sqrt{s_{NN}} = 200$ GeV, there is a significant suppression in meson yields compared to peripheral Au+Au or p+p results. In contrast, a large enhancement of baryons relative to mesons is observed at intermediate p_T .

The intermediate p_T region is considered to have both soft and hard hadron production mechanisms. Here, soft part includes hydrodynamic collective flow, quark recombination, and hard part includes jet fragmentation and its quenching. We observe some indications of a transition from soft to hard hadron production, for example, in proton-to-pion ratio. However, the relative magnitudes and particle-type dependence of these mechanisms are not yet fully understood. A systematic scan over different collision systems (colliding species, beam energies) at RHIC is one of the powerful ways to investigate the relative contributions of the production mechanisms. In 2004-2006 RHIC runs, the PHENIX experiment has accumulated Au+Au, Cu+Cu, p+p data at $\sqrt{s_{NN}} = 62.4, 200$ GeV that allow us to study various dependences, such as collision energy, system size, and overlapping geometry, of the hadron production.

In this talk, we will present measurements of hadron yields (π^\pm , K^\pm , p and \bar{p}) in the intermediate p_T region with an enhanced particle identification capability achieved by introducing the Aerogel Cherenkov detector in PHENIX. Using available data sets (Au+Au, Cu+Cu, p+p at $\sqrt{s_{NN}} = 62.4, 200$ GeV), we will show the particle ratios and nuclear modification factors as a function of the number of nucleon participants, transverse energy density, then discuss the scaling properties of the hadron production. It can provide valuable inputs for understanding the hadronization in high temperature matter created in relativistic heavy ion collisions.